barometer, and the amount of rainfall supplied to the author by Professor Brioschi of the Capodimonte Observatory.

From the discussion of these tables, it is concluded by the author that there is a striking relationship between the curves which mark sudden changes in atmospheric pressure and those which indicate distinct variations in the volcanic activity. As regards the relation of changes in volcanic activity with the lunar positions, the author speaks with greater doubt, the period over which the observations have extended being insufficient to justify definite conclusions; but he believes that his observations point to distinct tidal influences as affecting the liquid magma beneath the volcano.

II. "On an Apparatus for connecting and disconnecting a Receiver under Exhaustion by a Mercurial Pump." By J. T. Bottomley, M.A., F.R.S.E. Communicated by Sir William Thomson, F.R.S. Received March 1, 1886.

In experimental work with vacua, and especially with the high vacua given by the Sprengel pump, a connecting tap has often been much wished for which would enable the experimenter to remove a piece of apparatus from the pump for examination or preliminary experiment, and afterwards to reapply it to the pump without discharging the vacuum. So far as I am aware nothing satisfactory has hitherto been suggested. The ground glass stopcocks now made by some of the German and English glass workers are undoubtedly very highly finished; but sooner or later, even with the best of them, the air begins to work its way round the grinding marks, in spite of lubricants, and, worse than this, when the apparatus under exhaustion has been removed from the pump and gauges, there is no way of knowing whether or not the air is leaking in round the interstices of the ground glass stopcock.

To meet this difficulty, I have recently constructed a mercurial vacuum tap, which is certainly impervious to air, and which will, I think, be found to work easily and conveniently. In constructing it I have taken advantage of a tap described by Mr. C. H. Gimingham ("Proc. Roy. Soc.," No. 176, 1876), by means of which a piece of apparatus may be disconnected from the pump without discharging the vacuum of the pump; and thus by means of the complete tap, which I proceed to describe, the apparatus under experiment can be separated from the pump and replaced without either the pump or the apparatus being discharged.

The tap consists of three parts. AB is a tube containing a glass float, of which the upper end is conical, and ground very carefully at

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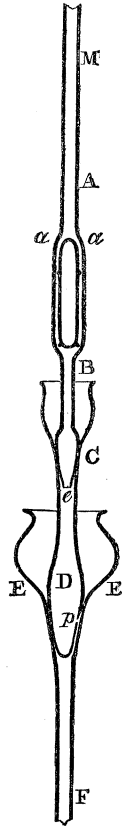
aa to fit a conical opening to the upgoing spirit-bore tube AM; and at M the apparatus which is to be exhausted would be blown on. At C there is an ordinary cup and stopper, ground to a very perfect fit,



and the joint at C is made perfectly air-tight in the usual way by pouring mercury into the cup. At the lower extremity of the part CD is a stopper closed at the bottom, but with a fine hole drilled at *p*; and in the tube of the cup EE there is a fine groove cut, which reaches half way up the ground part of the tube and stopper to *p*; but above *p* there is a sufficient length of grinding to make a perfect joint.* When the hole *p* is turned round to meet the groove, there is communication through and through the tap, that is to say, from the

* This cup and stopper form Mr. Gimingham's ingenious tap.

pump below F to the apparatus attached to M; but when the opening p is turned away from the groove the pump is cut off.

Suppose now that above p there is a vacuum, and that p is turned round so as to cut off the pump. Let the stopper at C be cautiously raised. Mercury flows from the cup C, and in the first place fills up the space below, and fresh mercury must be supplied to the cup and the supply kept up. The whole of the lower part of the space being filled, the mercury rises in the tube CB, lifts the glass float, and closes the opening *aa* with great pressure. To hold up the stopper at C during the flowing in of the mercury requires considerable force with an opening at C of an ordinary size; but as soon as the whole space from *aa* down to the bottom of D has been filled, the part of this force which is due to air pressure vanishes, and the stopper may be separated from C safely. The mercury in the tube AB does not drop out, as the orifice at e is very small; and thus there is nothing to prevent the apparatus under exhaustion being handled in any way that may be desired.

When the apparatus is to be reconnected with the pump, it is only necessary to replace the stopper in the cup C, and turn the hole p round to meet its groove. The mercury in the tube AB then drops into the pump. The float falls into its lowest position, and everything is once more as it was before the removal of the apparatus from the pump.

III. "Comparative Effects of different parts of the Spectrum on Silver Salts." By Captain W. de W. ABNEY, R.E., F.R.S. Received March 2, 1886.

In 1881 I communicated to the Royal Society ("Proc. Roy. Soc.," vol. 33) the results of a research I had made on the comparative effects of different parts of the spectrum on the haloïd salts of silver, and I pointed out that a mixture of iodide and chloride, and iodide and bromide of silver gave rise to a very curious photographic spectrum, a minimum of action taking place at G, the point where the iodide is mostly affected, two maxima consequently occurring. I also gave some theoretical reasons why this should be. About a year afterwards Herr Schumann, of Leipzic, called in question this result, as applied to bromo-iodide of silver, when the two salts were formed simultaneously, *i.e.*, when mixtures in water of soluble bromides and iodides were precipitated together by silver nitrate. He subsequently found that a mixture of the two salts after separate precipitation did give rise to a double maximum. Now my own experiments showed that in either case such double maxima existed, but perhaps